2015 DOE Vehicle Technologies Office Review Presentation

Zero Emission Cargo Transport Projects

(Hydrogen Fuel-Cell Electric Hybrid Truck & Zero Emission Delivery Vehicle Deployment)

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Project ID: VSS116

Overview

Hydrogen Fuel-Cell Electric Hybrid Truck Project

Timeline

- Start date – October 1, 2012
- End date – November 30, 2015

Budget

- Total funding
  - DOE share: $3,400,823
  - Contractor share: $4,253,556
- FY14 Expenditure:
  - $5,553.11
- FY15 Expected Expenditure:
  - DOE Share: $2,748,144
  - Contractor Share: $2,773,916

Barriers

1. High cost of Class 8 hydrogen fuel-cell electric hybrid trucks
2. Uncertainty related to deploying hydrogen fueling infrastructure and vehicle technologies in typical fleet use
3. Financing vehicles & coordinating multiple funding sources is very complicated

Partners

- Collaborators
  - Initial project partners – *Total Transportation Services, Inc (TTSI), Vision Industries Corporation, Air Products, EDF*
  - Selected projects partner – Gas Technologies Institute, US Hybrid (OEM), University of Texas Center for Electromechanics, Environmental Defense Fund.
- Project Lead
  - Houston-Galveston Area Council

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Overview

Zero Emission Delivery Vehicle Deployment

Timeline

- Start date – October 1, 2012
- End date – November 30, 2015

Budget

- Total funding
  - DOE share: $2,430,177
  - Contractor share: $2,760,000
- FY14 Expenditure:
  - $56,007.15
- FY14 Expected Expenditure:
  - DOE share: $981,231
  - Contractor share: $1,338,465
  - Remainder dependent on current Call for Projects

Barriers

1. High cost of low volume orders for all-electric medium-/heavy-duty trucks
2. Uncertainty in production capabilities and timeline for all-electric trucks
3. Fleet acceptance of electric drive vehicle by matching trucks to the correct applications and routes

Partners

- Collaborators
  - Center for Transportation and the Environment
  - Fleet Partner – UPS
  - OEM Partner – AMP Electric
- Project Lead
  - Houston-Galveston Area Council

Relevance

Primary Objective: Accelerate introduction and penetration of electric transportation technologies into the cargo transportation sector, specifically:

- 3 hydrogen fuel cell – electric hybrid Class 8 trucks*
- 30 all-electric delivery vehicles (i.e. box trucks, step vans)

Barriers	Project Activities
High cost of vehicles	Provide grant funding to incentivize deployment and testing of medium/heavy-duty zero emission vehicles
Risk associated with uncertain production capabilities and project financing	Restructured the process for granting ZECT funding through H-GAC. Allow fleets to select own OEM.
Financing vehicles & coordinating multiple funding sources is very complicated	Simplification of funding sources—specifically removing state air quality funding that conflicted with original partners' desired financing structure.
Challenges to fleet acceptance related to lack of infrastructure and matching vehicles to appropriate routes or applications	Provide funding for required infrastructure & conduct data collection and analysis on vehicle performance to demonstrate emission reductions

Milestones

Hydrogen Fuel-Cell Electric Hybrid Truck Project

Activity	Timeline	Status
Proposed Revision to Project Scope / Path Forward to DOE	Submitted 2/2014	Completed
Survey of OEMs, Vehicle Providers, and Fleets	5/2014 – 6/2014	Completed
Release Call for Projects; selection of new project partners	8/2014 – 1/2015	Completed
Complete Subcontract with Selected Subrecipient	2/2015-4/2015	Ongoing
Final Design, Procurement of Components and Build out of ZECT Power System	5/2015-10/2015	Future
Deployment of Vehicles for Testing and Integration of Hydrogen fueling station components	10/2015-6/2016	Future

Milestones

Zero Emission Delivery Vehicle Deployment

Activity	Timeline	Status
Call for Projects *(for fleet partners with all-electric delivery vehicle OEM)*	5/2014 – 9/2015	Ongoing for Remaining Vehicles
Select Partners & Issue Notice to Proceed	6/2014 – 9/2015	Complete (UPS); Ongoing for remaining partners
Purchase & Manufacture of Vehicles	9/2014 – 4/2014	Ongoing
Delivery of Vehicles	6/2015 – 9/2015	Future
Vehicle Testing begins	Beginning 6/2015	Future
Full Demonstration of All Vehicles	9/2015– 9/2017	Future

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Approach / Strategy

To be successful, the deployed technologies (both all-electric and hydrogen fuel-cell trucks) must be:

- Available
- Cost effective
- Meet performance expectations for operation and emission reductions

Therefore, current and future activities include:

- Providing remaining grant funding to selected partners to provide incentive for vehicle deployment and reduce barriers due to incremental costs of advanced technologies
- Completing Call for Projects for the Electric Delivery Vehicle project to identify fleet and OEM partners for remaining vehicle commitment
- Begin manufacture, deployment, vehicle monitoring, data collection, and performance / benefits analysis

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Accomplishments & Progress

Project Outcomes for FY14

- *Hydrogen Fuel-Cell Electric Hybrid:*
  - Completed survey to identify suppliers of zero emission Class 8 trucks
  - Received DOE approval for modification of project (reducing to 3 total trucks) and released Call for Projects
  - Selected replacement project partners
  - *Next Steps* – Manufacture and deployment of three hydrogen-electric hybrid Class 8 drayage trucks.

- *Zero Emission Delivery Vehicles:*
  - Issued Call for Projects to select partners for deployment of at least 30 trucks.
  - Selected project partner (UPS) for deployment of 18 AMP Electric medium duty delivery vehicles
  - *Next Steps* – Manufacture and deployment of UPS project vehicles; solicitation of partners for remaining 12 vehicles.

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Response to Previous Years Comments

Comment from 2014 AMR	Response
“The reviewer observed that the cost of this project would be way too high, and the reviewer was not sure if this technology can be even seen in production in 2030 and beyond.”	H-GAC recognized that the deployment of 20 Hydrogen-Hybrid drayage vehicles would not be possible, especially with the constraints of expected state funding and the financial situation of the OEM partner. H-GAC surveyed possible partners and based on feedback, worked with DOE to simplify the project to three total vehicles using only DOE federal funding.
“The reviewer stated that not too much progress has been made so far on the hydrogen fuel cell; in the meantime, the zero emission delivery vehicles were suspended.”	H-GAC has released a Call for Projects for both projects. New fleet/OEM partners have been selected.
“The reviewer commented that the project relied too much on the commercial partners.”	Both projects now include a project administration/technical partner to assist with technical aspects of project.

Collaboration

- Contract Lead – Houston-Galveston Area Council
- ***Zero Emission Delivery Truck***
  - Project Administration & Technology Partner – Center for Transportation and the Environment
  - Fleet Partner – UPS
  - OEM Partner – AMP Electric
  - *Remaining Fleet/OEM partners will be selected through call for projects.*
- ***Hydrogen Fuel-Cell Electric Hybrid Truck Project***
  - Project Administration & Technology Partner – Gas Technology Institute
  - Fleet Partner – Richardson Companies
  - OEM Partner – US Hybrid
  - Additional Technical/Outreach Partners – University of Texas CEM, Environmental Defense Fund.

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Remaining Challenges & Barriers

1) ***Addressing Project Delays***

   - Identification of remaining project partners for Electric Delivery Vehicle project
   - Ensure timely vehicle/infrastructure deployment for both projects

2) ***Reducing risks associated with uncertainty related to production of vehicles***

   - Electric Delivery Vehicle project structured to permit fleet to select OEM based on needs; technical partner offers assistance for selection if requested.

3) ***Simplifying project reimbursement / payment structure to address financial risks***

   - Projects restructured to reimbursement-only. Call for Projects written to clarify this fact.

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Future Work

Next Steps for FY15

- *Hydrogen Fuel-Cell Electric Hybrid:*
  - Finalize subagreement with GTI
  - Complete ZECT and infrastructure system design
  - Procurement of critical components for vehicle and infrastructure
  - Manufacture ZECT powertrain system
  - Integrate ZECT and hydrogen fueling station components, deploy vehicles.

- *Zero Emission Delivery Vehicles:*
  - Complete Call for Projects to select partners for deployment of remaining 12 trucks
  - Complete installation of necessary charging infrastructure
  - AMP Electric to deliver 2 testing vehicles to UPS for initial acceptance testing
  - Complete delivery and deployment of additional 16 AMP Electric vehicles

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Summary

Hydrogen Fuel-Cell Electric Hybrid Truck Project

- After substantial delays caused by challenges of multiple funding sources (federal, state and private), H-GAC is moving forward with a simplified project budget and new partners selected through a call for projects process.
- The current project team includes a simplified contract structure and the assistance of an administrative and technical partner (Gas Technology Institute).
    - The fleet partner included in the proposal has past experience with H-GAC vehicle replacement projects
- Upon completion of subagreement with GTI, H-GAC anticipates the deployment of three hydrogen-hybrid electric class 8 drayage vehicles, manufactured by US Hybrid
    - US Hybrid has successfully procured six such vehicles at California ports.

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Summary

Zero Emission Delivery Vehicle Deployment

- Uncertainties and financial challenges with the originally anticipated vehicle OEM created substantial delays
- H-GAC conducted a Call for Projects to select new project partners (fleets in partnership with selected OEM) for deployment of 30 trucks in the Houston region
- The selected fleet partners will purchase vehicles from selected OEMs for delivery and deployment on an aggressive timeline
- H-GAC has selected UPS to deploy 18 AMP Electric Vehicles
    - H-GAC and CTE continue to conduct outreach to area fleet to complete the deployment of the remaining 12 trucks

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